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UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,425	12/31/2003	Sreenivas Subramoney	30320/17231	9579

4743 7590 12/11/2007	EXAMINER	
MARSHALL, GERSTEIN & BORUN LLP	PORTKA, GARY J	
233 S. WACKER DRIVE, SUITE 6300	ART UNIT	PAPER NUMBER
SEARS TOWER	2188	
CHICAGO, IL 60606		

MAIL DATE	DELIVERY MODE
12/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/749,425	SUBRAMONEY ET AL.
	Examiner	Art Unit	
	Gary J. Portka	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>01 October 2007</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-5,7-15 and 17-21</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-5, 7-15, and 17-21</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1.   Claims 1-5, 7-15, and 17-21 are pending.

Response to Arguments

2.   Applicant's arguments with respect to all claims have been considered but are

not persuasive. Applicants have argued that Andreasson does not teach identifying

delinquent regions in a memory heap and executing garbage collection over them. This

argument appears to be based on the further argument that fragmentation does not

mean a region is delinquent. Examiner disagrees. Applicants have neither specifically

defined "delinquent", nor pointed to a definition required by the present disclosure, and

therefore the term is broadly given it's known common meaning, "failing to do what is

expected or required". Obviously a region that is fragmented fits this definition, since

once a region becomes too fragmented, it must be defragmented to reclaim space that

cannot be otherwise accessed. It is further noted that a fragmented region generally

has reduced free space available, and/or may allocate space at reduced speed, thus

supporting that such a region is delinquent. Also, since the claims require only "at least

one" region, as one example an entirely fragmented storage would read on the recited

delinquent region.

Claim Rejections - 35 USC § 112

3.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

4.   Claims 7, 14-15, and 17-18 are rejected under 35 U.S.C. 112, second paragraph,

as being indefinite for failing to particularly point out and distinctly claim the subject

matter which applicant regards as the invention.

5.   Claim 7 depends on claim 6, and claim 17 depends on claim 16, claims 6 and 16

having been canceled.

6.   Claim 14 recites "determining if any of the plurality of memory regions include a

threshold value". This language appears to state just that there is a threshold for each

region. That is, is the claim language met by a single threshold value that is set and

applies to all memory regions, or by a plurality of thresholds, one for each region (and is

there support for this interpretation)? Or, as is thought more likely, should the language

be changed to something like "determining if the frequency count of load miss memory

addresses for any of the plurality of memory regions has reached a threshold value"?

Claims 15, 17, and 18 incorporate this limitation by dependency.

Claim Rejections - 35 USC § 102

7.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8.   Claims 1-2, 4-5, 7-9, 13, and 19-21 are rejected under 35 U.S.C. 102(e) as being

anticipated by Andreasson, US 7,174,354 B2 (hereinafter "Andreasson").

9.   As to claims 1-2, 4, and 19-20, Andreasson discloses *an article with medium*

having instructions to cause a machine to, and system with hardware to: obtain from a

performance monitor performance data for a memory heap having a plurality of memory

regions (keep track of fragmentation, how much memory available, speed the program

allocates memory time spent on executing instructions, see col. 19 line 55 to col. 20 line

29, also claim 1, col. 31 lines 47-49), *based on the performance data, determine if at*

least one of the regions is a delinquent region (since as an example an area may be

found fragmented, col. 21 lines 40-47, also claim 1, col. 31 lines 49-51), *and in*

response to that determination, execute a memory management routine to optimize that

region of the heap by executing a garbage collection routine on at least one delinquent

region, the routine re-arranging the plurality of regions stored in the heap to optimize the

heap (col. 19 and 20 cited above disclose performing controlling garbage collection

based upon the monitoring; it is also noted that the garbage collection may be

performed on regions as described at col. 12 lines 10-28 and 57-67, section of the heap

to optimize may be selected, see col. 22 lines 52-62, selection of incremental approach

and size of section, col. 23 lines 15-21, also see claim 1 lines 52-54).

10.   As to claim 5, Andreasson discloses the execution of a second memory

management routine on a non-delinquent portion, since the garbage collection routine is

variously applied to different sections (for example, in the cited incremental method or in

the young and old generation method), or alternatively, the compaction may be

considered a secondary method to the garbage collection.

11.   As to claims 7 and 21, the garbage collection routine is selected from the group

recited (see col. 10 line 25 to col. 11 line 27).

12.   As to claim 8, size granularity of memory region is disclosed (as previously cited,

incremental sections, or alternatively, size of thread local regions at col. 22 lines 57-62).

13.   As to claim 9, keeping track of fragmentation, how much memory is available,

speed memory is allocated, time spent on executing instructions, inherently require

counting occurrences of the performance data to the extent recited.

14.   As to claim 13, blocking the delinquent region is taught to the extent claimed

since certain garbage collection methods will block the region being collected until

complete.

Claim Rejections - 35 USC § 103

15.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16.   Claims 3 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Andreasson.

17.   As to claim 3, Andreason teaches several performance monitoring methods, but

does not specifically describe the cache or TLB miss, or other elements of the group.

However, these elements were all well known parameters that could advantageously be

used to indicate performance of a memory or a memory region, and Examiner takes

Official Notice that it would have been obvious to select from a group of these

parameters to get performance data in the system of Andreasson, because these were well known indicators of performance.

18.   For support of this position, as requested, Berry et al., US 6,732,357 B1 is cited. At col. 23 lines 8-11 it is noted that "cache misses" are useful to monitor and thus optimize performance. This system is for optimizing performance and resource consumption (see col. 1 lines 34-62), and further includes garbage collection for heap defragmentation (col. 9 lines 15-21). Clearly an artisan would have recognized cache misses as a parameter for optimizing performance data in any such system, such as in Andreasson.

19.   As to claim 10, although Andreasson discloses performance measurements that inherently count data as described hereinabove, it is not clear that these counts are compared to a threshold to determine delinquent regions. However, such a step would have been clear to one of ordinary skill in the art. For example, one of the performance measurements is fragmentation, to determine whether it is "very fragmented", which would be best determined by comparing to some threshold which was predetermined to be the threshold of becoming fragmented enough to call very fragmented. Likewise, measurement of speed a program runs, time spent executing, and average size of allocated objects would easily be seen as advantageously compared to thresholds in order to determine the points at which these measurements indicate some corrective action should be taken. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to compare measured counts of performance data to a

threshold, because this was the intuitively obvious way of setting limits at which the measurements indicate a corrective action should be taken.

20.   As to claims 11-12, determination of sufficient number of samples, and determining an additional sample to be taken, were well known in digital data performance measurement, and Examiner takes Official Notice that such data measurement steps would have been well known to one of ordinary skill in the art at the time, in order to verify that the amount of data taken was of sufficient volume to give a reliable indication of the memory condition.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary J. Portka whose telephone number is (571) 272-4211. The examiner can normally be reached on M-F 9:30 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Hyung Sough can be reached on (571) 272-6799. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gary J Portka
Primary Examiner
Art Unit 2188

December 8, 2007

**GARY PORTKA
PRIMARY EXAMINER**